

μChem 410

Nickel Sulfamate Electrolyte

Properties

- process especially developed for micro techniques
- the deposits are extreme low on inner stress
- the electrolyte is already worked in, it is ready for plating

Application

The process μChem 410 includes the following products:

- μChem 410 Nickel Sulfamate Electrolyte is the already worked in electrolyte
- μChem 410/1 Wetting Agent is already included in the delivered electrolyte in the concentration of 2 %vol
- μChem 410/2 Additive is used for the pH correction of the electrolyte

make-up values:

	μChem 410 Nickel Sulfamate Electrolyte	undiluted	
analytical values:	nickel	100 g/l	(100-110 g/l)
	boric acid	40 g/l	(40-45 g/l)
make-up:	The delivered electrolyte is premixed readily and can be used for plating after warming up to its working temperature.		
temperature:	50 °C	(48 - max. 53 °C)	
pH-value:	3.8	(3.7-4.0)	
	adjust with μChem 410/2		
cathodic current density:	2 A/dm ²	(1-3 A/dm ²)	
deposition rate:	12 μm/h at 1 A/dm ²		
ratio			
anode / cathode:	1:1 to 1.5:1		
anodes:	clippings or bullets out of S-depolarised nickel in baskets of titanium with anode bags		
agitation:	strong circulation is necessary		
tank material:	out of polypropylene, strengthened		
filtration:	continuous filtration with 5-6 bath volumes per hour; pore size: 0.2 μm		
heating:	regulated by thermostat, out of acid resistance material (e.g. porcelain, Teflon)		
exhaust:	recommended for workers protection		

Technical Specification

(at 20 °C)	Appearance	Density (g/ml)	pH-value (conc.)
µChem 410	liquid, green, clear	1.356 (1.30-1.40)	3.8
µChem 410/1	liquid, yellowish, clear	1.003 (0.99-1.02)	3-4
µChem 410/2	liquid, colourless, clear	1.050 (1.04-1.06)	0-1

Maintenance and Analysis

Compensate evaporation losses with deionised water.

The desired analytical values have to be in their ranges:

Low contents of nickel or boric acid will lead to burnings, too much boric acid produces pitting. A low pH-value reduces the levelling, a high pH will lead to burnings.

During the electroplating, µChem 410/1 Wetting Agent is nearly not consumed. A decrease of µChem 410/1 is only caused by drag-out. So add µChem 410/1 only if necessary: if pitting occurs or if the micro roughness is not plated completely with nickel.

Dosage: if necessary add 2 ml/l µChem 410/1 Wetting Agent

During the plating process, the pH will rise continuously. The addition of µChem 410/2 will lower the pH-value to keep it constant at pH 3.8.

Sample Preparation

Take a sample at a homogeneously mixed position. Let it cool down to room temperature. If the sample is turbid, let the turbidity settle down and decant or filter the solution.

Nickel – Analysis by Titration

reagents: 0.1 mol/l EDTA (Titriplex III)
ammonia solution (conc.)
indicator: murexide

procedure: 1. Pipette 1 ml bath sample into a 200 ml Erlenmeyer flask.
2. Dilute to approx. 100 ml with deionised water.
3. Add 12 ml conc. ammonia solution.
4. Add a spatula tip of indicator.
5. Titrate with 0.1 M EDTA from yellow to violet.

calculation: consumption in ml · 5.87 = g/l nickel

Boric Acid – Analysis by Titration

reagents: 0.1 N NaOH solution
EDTA sodium salt
Mannitol
NaOH solution (15 %)

procedure: 1. Pipette 2 ml bath sample into a 250 ml Erlenmeyer flask.
2. Dilute with approx. 50 ml deionised water.
3. Add 2-4 g EDTA-salt.
4. Adjust the pH-value to 7.9 with 15 % NaOH solution.
5. Add 2 g Mannitol to the **clear** solution.
6. Titrate with 0.1 N NaOH solution to pH 7.9 again.

calculation: consumption in ml · 3.09 = g/l boric acid

Ingredients

µChem 410:

- boric acid

Consumption and Stock Keeping

The consumption depends heavily on the drag-out. To determine the exact amounts of drag-out, see [SurTec Technical Letter 11](#).

In order to prevent delays in the production process, per 1,000 l bath the following amounts should be kept in stock:

µChem 410/1 Wetting Agent 1 kg
µChem 410/2 Additive 1 kg

Product Safety and Ecology

The safety instructions and the instructions for environmental protection have to be followed in order to avoid hazards for people and environment. The Material Safety Data Sheets (according to European legislation) contain explicit details for this.

The following hazard designations and classifications into water hazard classes (WHC) have to be taken into account:

<u>product</u>	<u>hazard designation</u>	<u>water hazard class</u>
µChem 410	T - Toxic N - Dangerous for the environment	WHC 3
µChem 410/1	Xn - Harmful	WHC 1
µChem 410/2	-	WHC 1

Warranty

We are responsible for our products in the context of the valid legal regulations. The warranty exclusively accesses for the delivered state of a product. Warranties and claims for damages after the subsequent treatment of our products do not exist. For details please consider our [general terms and conditions](#).

Further Information and Contact

In our forum, you can discuss topics of the surface technology:
<http://forum.SurTec.com/>

If you have any questions concerning the process, please contact your local technical department: <http://SurTec.com/International.html>

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